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AN APPROACH TO BIOLOGICAL ASSESSMENT

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RENEWABLE RESOURCES CONSULTING SERVICES LTD.

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NORTHEASTERN ALBERTA REGIONAL PLAN

AN APPROACH TO BIOLOGICAL RESOURCE ASSESSMENT

NOVEMBER 1971

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EKISTIC DESIGN CONSULTANTS LIMITED

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INTRODUCTION

The development and use of natural resources in northeastern Alberta will affect terrestrial and aquatic environments to varying degrees. The overall objective of Renewable Resources Consulting Services Ltd. within the Northeast Alberta Regional Plan is to provide Ekistic Design Consultants Ltd. with biological and ecological information which will aid in planning these developments. The area under consideration is that sector of Alberta lying within the outer boundaries of Improvement District No. 18 and north of Township 80.

The following report discusses our approach towards an initial assessment of the vegetation, mammal, bird and fishery resources within the region. This assessement is necessary to locate developments in ecologically less sensitive areas or to mitigate unavoidable damage. Proposed studies will commence in November 1974 with a report submitted in May 1975. Research which will be required subsequent to May 1975 will be appended to the May report.

APPROACH

A biophysical land classification scheme such as that suggested by Lacate (1969) would probably best meet the regional objectives of this project. Within this system, ecologically

significant land units are delineated on the basis of landform-soil-vegetation patterns and evaluated as to their land use capability. Sufficient data required for such a system are not available for the entire region, nor could they be collected within the time constraints of this study. However, this approach will be implemented for special areas (those designated by Ekistics Design Consultants Ltd. as being potential sites for urban, recreational or transportational development) to the extent possible using available air photos, published data, field reconnaissance and inventories.

For the entire study region, landscapes will be mapped according to forest types and classified as to ungulate and waterfowl production capability. These units will be described using existing data and results obtained from the proposed field studies. An attempt will be made to classify streams and lakes in the region as to their fishery potential on the basis of data obtained on physical factors through a review of existing information and field reconnissance.

REGIONAL OBJECTIVES

REGIONAL VEGETATION

Objectives

1. Produce maps of forest types.
2. Describe forest types represented in the region in terms of structure and species composition.
3. Describe successional trends exhibited by vegetation in the region.

Methods

A review of the literature will be conducted to obtain all available vegetational information from the study region and from the boreal forest in general. Communications with knowledgable people will also be established to aid in accumulation of data and the interpretation thereof.

Forest cover maps will be used as a basis for generating forest type maps of the region. Forest type maps will concentrate on tree species composition rather than timber production parameters.

REGIONAL

WILDLIFE

Objectives

1. Develop land classification units for ungulates and waterfowl.
2. Evaluate ungulate and waterfowl production capability within land classification units.
3. Delineate winter concentration areas for ungulates.
4. Map registered furbearer traplines for the entire northeastern Alberta region and determine furbearer catch and annual income for regional traplines.

Methods

An extensive literature review will be conducted to identify existing relevant information concerning northeastern Alberta. A regional land classification system will be developed for ungulates and waterfowl utilizing available information including forest cover and topographical maps, and aerial photos. For ungulates, winter utilization of forest cover types will be determined from aerial surveys of the region. Transects allowing approximately 4 percent coverage of the region will be flown in early and late winter to determine habitat preference and areas of concentration. Land classification units will be derived from forest cover types and/or physical parameters (slope, snow depth, etc.). The degree of refinement of capability ratings for classification units will be dependent upon the level of

information available.

For waterfowl, major wetlands will be broadly classified as to their potential importance for waterfowl production. Air photo interpretation and aerial surveys will be the primary basis for development of classification units, with some use of forest cover, topographical and surficial geology maps. Evaluation of these classification units should at least include preliminary habitat and breeding-pair aerial surveys within the region in May 1975.

Introduction

Numerous deficiencies in existing fishery baseline data have been identified. Preliminary investigations of fish populations in the major lakes of the area have been carried out. A preliminary habitat assessment of many streams in the area has also been carried out. This assessment was, however, based on a minimal evaluation of physical habitat features and involved very little actual fish sampling. The inadequacies in the rating system were stated and limitations were necessarily attached to the resulting classification scheme. This type of classification system is useful in identifying streams of obvious importance but is less useful in identifying medium and low quality streams. A useful approach would be to establish a systematic classification system based on physical characteristics determined in the office, prior to field studies. The validity and confidence limits of the system should be established during later field studies. Field investigations on representative streams or sections of streams should be carried out at selected times of the year to give a true assessment.

Included should be an assessment during the two critical flow periods i.e. mid-summer and late winter. However, because the requirement for a completed fishery classification system by fall 1975, we will be unable to carry out studies during open water conditions. This places obvious limitations on the quality of the classification system. Some of the resultant deficiencies

however can be minimized through systematic winter studies. The methodology for the design of the basic classification system and for supplementary field studies is described in the following sections:

Methodology

Streams

The basic classification system for streams will be based on the stream slope (average gradient) determined from topographic maps. Stream gradients directly affect fish habitat suitability by influencing water temperature, flow velocity, and riffle and pool ratios. Stream gradient also affects fish distribution indirectly by determining the physical nature of the stream bed, the composition and abundance of aquatic flora, and the composition and abundance of bottom fauna. The effect of stream gradient in determining fish distribution and abundance has been documented both in Europe and in North America. Also considered, will be flow potentials, based on the nature and size of watersheds, and actual winter flows determined through field investigation.

Existing data on fish distribution for the area and from other areas will be related to gradient conditions in order to establish habitat quality criteria for the various gamefish species in the area (Arctic grayling, northern pike, yellow walleye).

It is likely that only two categories of stream will be recognized:

1. those suitable for sportfish, and

2. those unsuitable for sportfish.

The classification scheme will however be set up in such a manner that additional information derived from subsequent studies can be systematically incorporated. As additional information is gathered the classification scheme can be expanded to include more habitat quality categories and to refine habitat quality criteria.

Pre-Field Activities

- Determine gradients of:

a. Major streams in the study area.

b. Major tributaries to the above streams.

c. Streams which are representative of a stream type whose members are similar due to their being located in watersheds of similar size, topography, surficial geology, and vegetation, etc.

- Determine where possible, for above streams, potential flow conditions from watershed characteristics.

- Determine gradients and watershed characteristics for streams and portions of streams within the region which are known to support sportfish (also for selected streams from outside the region).

- Designate streams to be included in systematic winter surveys.

Field Activities

- Determination of winter flow conditions and particularly the capability of the stream to overwinter sportfish.

- Identification of actual overwintering areas where possible.

Post-Field Activities

- Establish a stream classification system based on gradient, flow data, and the actual fish utilization data that is available.

Lakes

The situation regarding lakes in the area is less a problem for two reasons:

1. The majority of the potentially high quality lakes have been surveyed, and

2. Much can be learned about the quality of lakes from a winter survey.

Lakes which appear to have fishery potential and which have not been investigated previously will be included in the winter survey. McLelland Lake is one example of a lake which requires winter sample.

Pre-Field Activities

- Establish classification scheme for previously studied lakes.
- Designation of potential lakes for winter investigation.

Field Activities

- Determination of lake morphometry (depth, basin shape).
- Determination of substrate type and its productivity with regard to bottom organisms.
- Determination of dissolved oxygen characteristics and other pertinent water quality parameters.
- Determination of resident fish populations by underice gill-netting.

Post-Field Activities

- Determination of fishery potential of lake (commercial and recreational).

- Placement of lake in regional lake classification scheme.

SPECIAL AREA OBJECTIVES

SPECIAL AREAS

VEGETATION

Objectives

1. Develop a biophysical land classification to produce maps delineating land systems i.e. areas of land throughout which there is a recurring pattern of landforms, soils, and vegetation.

2. Describe the distribution of land types, soils, and vegetation which occur within each land system.

Methods

Development of a biophysical land classification will require analysis of existing information on landform, surficial deposits, topography, forest cover, vegetational succession, soils surveys, and published reports. Limited winter field reconnaissance will also be necessary.

SPECIAL AREAS

WILDLIFE

Objectives

1. Evaluate ungulate and waterfowl production capability within biophysical land classification units.

2. Delineate winter concentration areas for ungulates.

3. Determine furbearer utilization of vegetative community types.

4. Present general discussion of the relationship between vegetation community types and passerine bird species present.

Methods

Complete aerial surveys of special areas for ungulates during early and late winter will provide information on ungulate habitat preference and location of winter concentration areas. These will provide a basis for development of land capability classifications for special areas. Waterfowl production capability will be evaluated on the basis of existing information and that which can be obtained from air photo interpretation or other mapped information. A preliminary habitat and breeding-pair survey should be made of the special areas in May 1975.

Furbearer utilization of vegetative community types will be determined from winter track counts in snow. This will provide information on species present and will additionally give an index to density within various community types.

Information concerning relationships between passerine bird species and vegetative community types will be obtained entirely from a literature review.